

directly to the deprotected peptide 13 by the *p*-nitrophenyl ester coupling method, and the product was purified by HPLC to give conjugate 3.¹⁵⁾

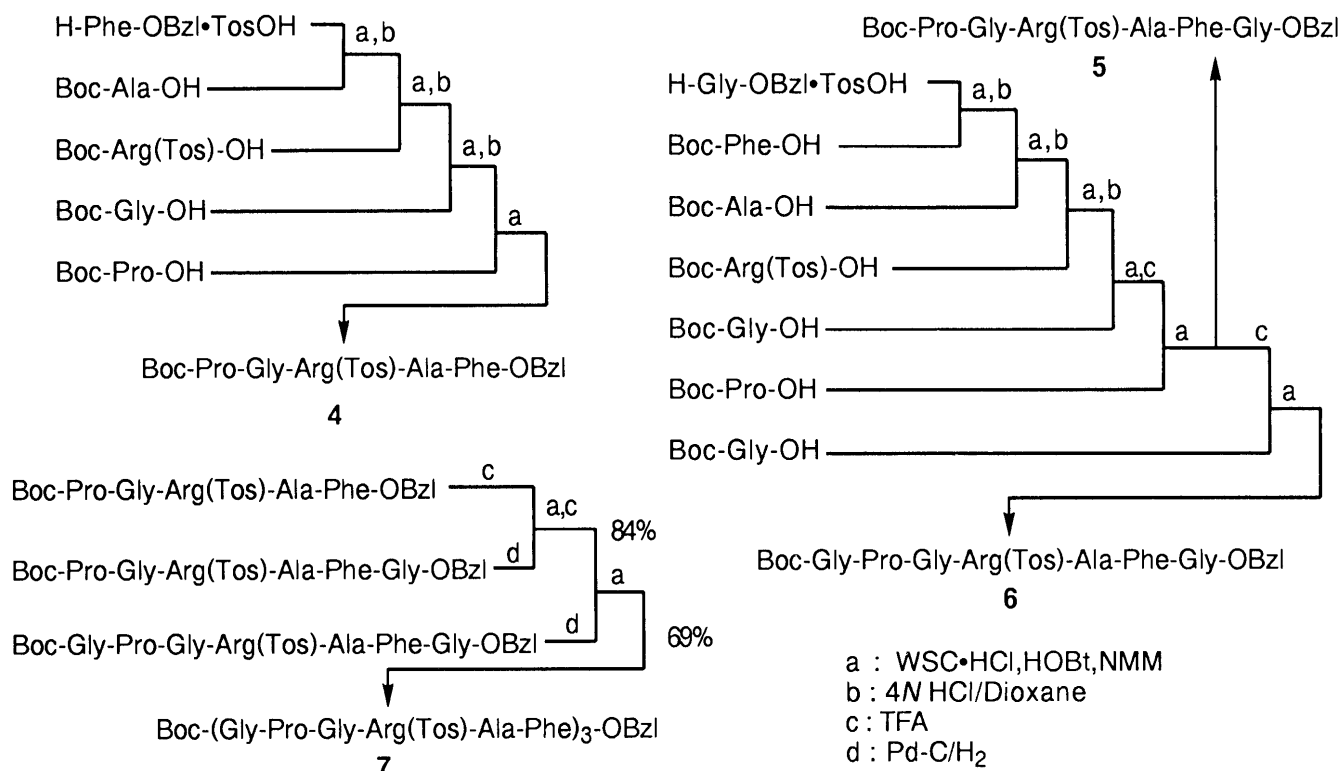


Chart 1

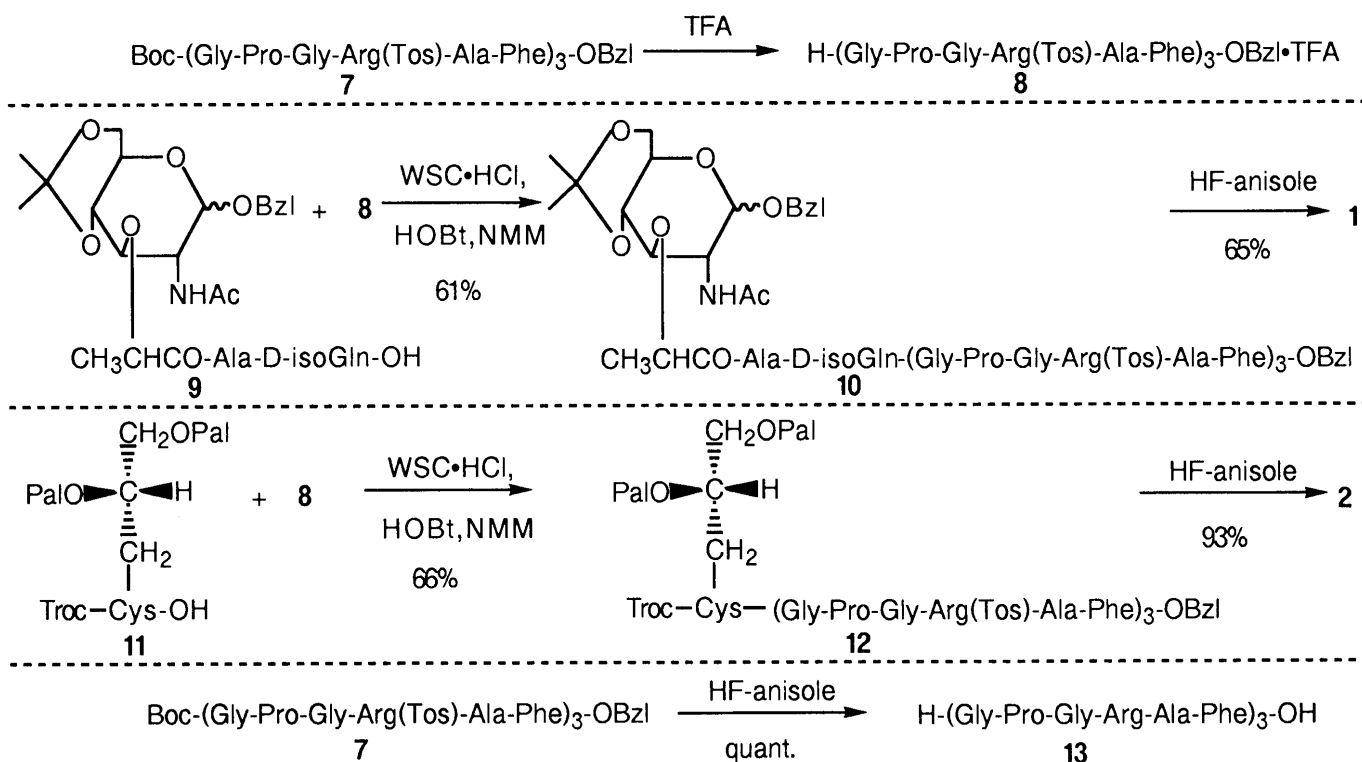
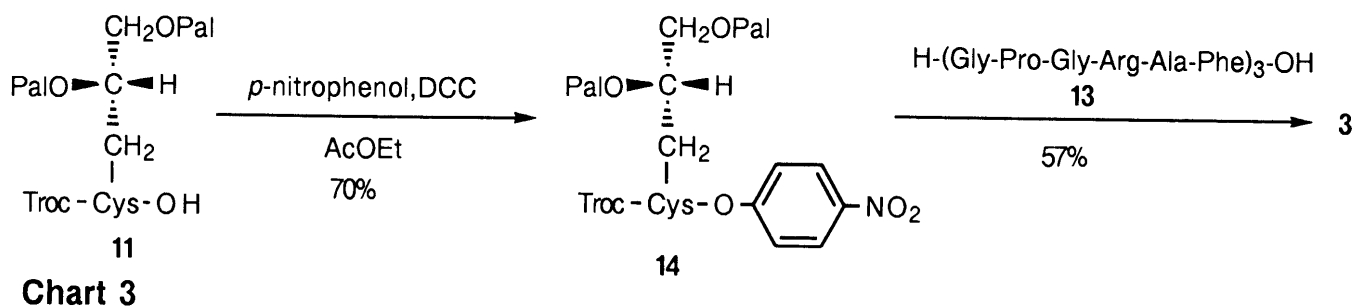


Chart 2



The conjugates 1,2 and 3 were examined for their ability to induce HIV-derived peptide-specific antibody in male BALB/c mice. The groups of animals were sensitized subcutaneously three times with each compound in a dose of 50 nmol. Blood was taken from the retroorbitalis several times after the sensitizations. The titers for the specific anti-peptide antibody of each serum were determined in a 96-microplate coated conjugate as the antigen using ELISA. The sera sensitized by compound 3 showed about twice as much anti-peptide antibody response as compared with those sensitized by the peptide 13. Further studies on the biological activities of the compounds are in progress.

REFERENCES

- 1) F. Ellouz, A. Adam, R. Ciorbaru, E. Lederer, *Biochem. Biophys. Res. Commun.*, **59**, 1317 (1974).
- 2) S. Kotaŋi, Y. Watanabe, F. Kinoshita, T. Shimono, I. Morisaki, T. Shiba, S. Kusumoto, Y. Tarumi, K. Ikenaka, *Biken J.*, **18**, 105 (1975).
- 3) S. Kobayashi, T. Fukuda, H. Yukimasa, M. Fujino, I. Azuma, Y. Yamamura, *Bull. Chem. Soc. Jpn.*, **53**, 2570 (1980).
- 4) W. G. Bessler, R. B. Johnson, K. H. Wiesmuller, G. Jung, *Hoppe-Seyler's Z. Physiol. Chem.*, **363**, 767 (1982).
- 5) K. H. Wiesmuller, W. G. Bessler, G. Jung, *Hoppe-Seyler's Z. Physiol. Chem.*, **364**, 593 (1983).
- 6) R. B. Johnson, S. Kohl, K. H. Wiesmuller, G. Jung, W. G. Bessler, *Immunobiol.*, **165**, 27 (1983).
- 7) W. G. Bessler, M. Cox, A. Lex, B. Shur, K. H. Wiesmuller, G. Jung, *J. Immunol.*, **135**, 1900 (1985).
- 8) M. Kurimura, M. Takemoto, K. Achiwa, *Chem. Pharm. Bull.*, **38**, 1110 (1990).
- 9) a) T. Kishimoto, Y. Hirai, K. Nakanishi, I. Azuma, A. Nagamatsu, Y. Yamamura, *J. Immunol.* **123**, 2709 (1979); b) G. Jung, K. H. Wiesmuller, G. Becker, H. J. Buhning, W. G. Bessler, *Angew. Chem. Int. Ed. Engl.* **24**, 872 (1985); c) K. Deres, H. Schild, K. H. Wiesmuller, G. Jung, H. G. Rammensee, *Nature*, **342**, 561 (1989); d) M. Loleit, W. Troger, K. H. Wiesmuller, G. Jung, M. Strecker, W. G. Bessler, *Biol. Chem. Hoppe-Seyler*, **371**, 967 (1990).
- 10) K. Javaherian, A. J. Langlois, G. J. LaRosa, A. T. Profy, D. P. Bolognesi, W. C. Herlihy, S. D. Putney, T. J. Matthews, *Science*, **250**, 1590 (1990).
- 11) S. J. Hecker, M. L. Minich, K. Lackey, *J. Org. Chem.*, **55**, 4904 (1990).
- 12) $[\alpha]_D^{21}$ -35.2°(c 0.20, 3%AcOH), FABMS(m/z) 2250(M+H)⁺.
- 13) $[\alpha]_D^{25}$ -42.8°(c 0.22, 3%AcOH), FABMS(m/z) 2367(M+H)⁺.
- 14) $[\alpha]_D^{21}$ -57.3°(c 0.22, 3%AcOH), FABMS(m/z) 1775(M+H)⁺, Amino acid analysis(6N HCl, 110°C, 24h): Gly 5.98(6), Ala 3.50(3), Phe 3.15(3), Arg 2.73(3), Pro 2.64(3).
- 15) $[\alpha]_D^{25}$ -50.4°(c 0.25, 3%AcOH), FABMS(m/z) 2604(M+H)⁺.

(Received June 6, 1994; accepted July 12, 1994)